UNITED STATES PATENT OFFICE.

JOSEPH A. WILLIAMS, OF CLEVELAND, OHIO.

EXPLOSIVE-ENGINE.

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To all who: it may concern:

Be it known that I, JOSEPH A. WILLIAMS, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Explosive-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to explosive-engines especially of the two-cycle type, and has particular reference to means for scavenging the cylinder or for removing the products of combustion after the explosion has taken place.

It is usual in two-cycle engines to scavenge the cylinder by blowing out the products of combustion with the explosive mixture which is to be used for the next explosion. This operation is either wasteful or is ineffectual, for if a sufficient blast of mixture is employed to entirely scavenge the cylinder a portion of the mixture will escape with the burned gases, and if an insufficient quantity is used the mixture in the cylinder will become contaminated, which will reduce the power if it does not choke down the engine entirely. In order to overcome these defects, I precede the explosive charge with a blast of air, which air is sufficient to scavenge the cylinder before the mixture is introduced. With this result in view I have devised the structure shown in the accompanying drawings, in which—

Figure 1 is a sectional view through the cylinder and crank chamber of a two-cycle explosive-engine, the same showing my invention applied thereto. Fig. 2 is a similar view showing the piston and crank in another position. Fig. 3 is a detail view of a form of carbureter which is suitable for use with my invention, said figure also showing the manner in which the same may be applied thereto; and Fig. 4 is a detail view of the valve mechanism for controlling the admission of air to the crank-chamber.

For reasons well understood it is necessary to scavenge the cylinder of explosive-engines at the end of each explosion, and in two-cycle engines this is usually accomplished by the mixture itself when introduced into the cylinder for the next explosion. I propose to use a blast of air for this purpose, said blast of air being supplied through the same means as that which conducts the mixture to the cylinder.

Referring now to the drawings, in which similar reference characters designate corresponding parts throughout the several views, 1 represents the cylinder of an explosive-engine, which is made continuous with the casing 2 for the crank, said casing being closed at the front end by a suitable cap-plate 3, so that the crank-chamber is made gas-tight.

4 represents the piston, which is connected by a suitable rod 5 with the pin 6 of the crank 7.

The cylinder is surrounded with the usual water-jacket 8 and is provided with some suitable form of sparking device, as is indicated at 9. The inlet-port is shown at 10 and the exhaust-port at 11.

The parts thus far referred to being more or less common in engines of this type, a detailed description thereof is not deemed necessary.

Connected at one of its ends with the cylinder at the inlet-port and at its other end with the crank-chamber is a pipe 12 of a suitable size, shape, and length, said size and length depending upon the particular engine to which it is attached, as will be hereinafter set forth. In said pipe at a point as near the inlet-port as practicable is a suitable check-valve 13, through which air may be admitted into said pipe, said valve being shown in Fig. 4 as of the pop-valve type, the same being held normally against its seat by a spring 14, which bears with one of its ends against the valve-casing and with its other end against a washer 15 on the end of the valve-stem. In order to regulate the tension of said spring, and thereby control the action of the valve, a nut 16 is provided, which nut is threaded upon the valve-stem, so as to cause the washer to bear with greater or less tension on the spring, and thus regulate the pressure of the valve 13 upon its seat. As near to the other end of the pipe 12 as is practicable there is attached a suitable form of device for supplying the fuel. This fuel may be of any suitable character which mixed with air in the proper proportion will produce the explosive mixture. As shown, a liquid fuel, such as gasolene, is employed, said liquid being conveyed through a pipe 17 to a controller or regulator, the casing for which is shown at 18, from which it is conducted to the pipe 12 through the tube 19, said tube having its end projecting into the pipe 12 and being formed with a nozzle, as is shown in Fig. 3. The admission of the liquid into the controller is regulated by a needle-valve 20, which closes the lower end of the pipe 17 within the casing